

MODIS

Science Data Processing Software

Version 1 System Description

Final Review



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MODIS
Science Data Processing Software
Version 1 System Description

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1. INTRODUCTION

The Moderate-resolution Imaging Spectroradiometer (MODIS) Science Data Production Software (SDP S/W) System Description Document (SDD) is intended to meet the following key objectives:

- Provide a description of the structure and high-level workings of the MODIS SDP S/W.
- Serve as a basic reference to the more detailed documents related to the MODIS SDP S/W, products, and operations procedures.
- Satisfy the SDD requirement specified in the Science Software Integration and Test (SSI&T) Procedures for the MODIS Instrument at the Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC).

This plan has been organized according to the guideline for system description documents outlined in Appendix C of the Science User's Guide and Operations Procedure Handbook for the EOS Core System (ECS) Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CC-002-002 (referred to as DID 205). The document contains the following sections:

- Section 1 is an introduction to the MODIS Version 1 (V1) system.
 - Section 1.1 provides a brief background of the MODIS SDP system.
 - Section 1.2 provides a functional description of the MODIS SDP system concepts.
 - Section 1.3 is an overview of the MODIS SDP system structure.
 - Section 1.4 provides a description of the MODIS SDP operational scenario.
- Section 2 is a listing of relevant documents.
- Section 3 provides a brief description of the various temporary, intermediate, or product outputs.
- Section 4 identifies and describes the Product Generation Executives (PGEs).
- Section 5 describes nominal performance measures for each PGE.
- Section 6 points to the MODIS Operations Manual for detailed operations instructions.
- Appendix A contains the Acronym List.

- Appendix B provides the requirements traceability.
- Appendix C contains the structure figures for each PGE.

1.1 Background

The overall MODIS science objective is to make long-term observations of the Earth for improved understanding of the global dynamics and processes occurring on the land, oceans, and lower atmosphere. Product resolutions range from one day to several months in the temporal scale and from 250 m to 1 km on the spatial scale. The MODIS measurement objectives include surface temperature (land and ocean), ocean color (sediment, phytoplankton), cloud characteristics, aerosol concentrations and properties, atmospheric temperature and moisture structure, snow and ice cover characteristics, and ocean currents. Additional measurement objectives include chlorophyll concentration, primary productivity, sediment transport, standing water, wetland extent, vegetation properties, hemispherical albedo, bi-directional reflectance, cloud properties, and aerosol radiances. Derived MODIS products include global vegetation maps and global change (deforestation and desertification).

1.2 System Concepts

The MODIS SDP S/W system is designed to run within the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS). The MODIS system is a part of the Science Data Processing Segment (SDPS) of the EOS Ground System (EGS). Figure 1-1 shows the major subsystems comprising the SDPS. The reader should refer to the ECS design documents if more details about the SDPS are desired. These documents can be found on the internet at Universal Resource Locator (URL): <http://edhs1.gsfc.nasa.gov>.

Figure 1-2 is the context diagram for the purposes of the SDD. The MODIS SDP S/W system receives MODIS Level 0 data and any required ancillary data via the SDPS and produces the MODIS products, which are archived by the SDPS. All processing software is categorized according to the level of data products it produces, with the data level definitions given in Table 1-1.

The actual data processing and product generation is performed at the DAACs. The SDPS will be installed and operated at each of the DAACs, along with data processing hardware and other DAAC-specific systems. The MODIS data processing will be distributed among three DAACs located at GSFC, the EROS Data Center (EDC) and the National Snow and Ice Data Center (NSIDC).

The MODIS software processes and the products they generate are defined in Table 3-1 of the MODIS Science Data Processing Software Version 1 Requirements Specification. The SDPS design requires that the software be designed and installed at the DAACs as a set of PGEs. The concept of the PGE is discussed in the following section.

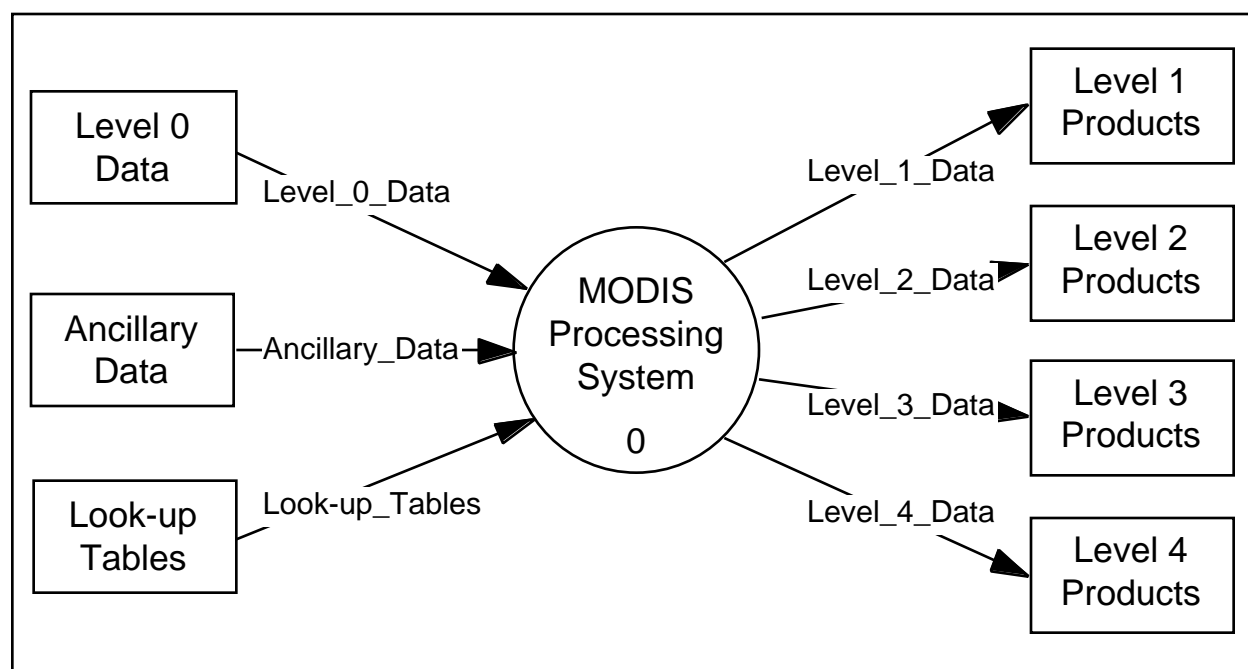


Figure 1-2. MODIS SDP S/W Context Diagram

Table 1-1. MODIS Data Level Definitions

Data Level	Data Definition
Level 0	Instrument data at original resolution, time order-restored, with duplicate packets removed.
Level 1A	Level 0 data which are reformatted with calibration data and other ancillary data included. Geolocation information for each 1 km spatial element of the reformatted swath data will be stored as a separate product.
Level 1B	L1A data to which the radiometric calibration algorithms have been applied to produce radiance's or irradiances.
Level 2	Geophysical parameter data retrieved from the L1B data by application of geophysical parameter algorithms.
Level 2G	Similar to L2 but contains pixel to grid mappings within the product files.
Level 3	Earth-gridded geophysical parameter data, which have been averaged, gridded, or otherwise rectified or composited in time and space.
Level 4	Model output or results of analysis from lower-level data; for example, variables derived from multiple measurements.

The MODIS PGEs will be scheduled and executed entirely under control of the SDPS Planning and Data Processing subsystems operating at the DAACs. The SDPS also provides all data archive, inventory, query, distribution and other required services. Thus, the MODIS SDP S/W consists entirely of the individual PGEs, and will only run automatically in the SDPS or other environment which provides comparable functionality.

The MODIS instrument surveys the Earth's surface continuously, in one of two modes: day mode, in which data from all 36 bands are collected; and night-mode, in which data collection is limited to 17 infrared bands. The data collection mode is commanded by the Flight Operations Segment (FOS). This distinction is important because several of the Level 2 (L2) processes only use day mode data. The current scenario is to collect 50% of the data in day mode, during the daylit portion of the orbit.

The fundamental units of MODIS processing and products are: the granule, for Level 1 (L1) and L2 products; the tile, for Land Level 2G (L2G) and Level 3 (L3) products; and the global grid, for Oceans and Atmosphere L3 products and all Climate Modeling Grid (CMG) products. The V1 granule definition is based on a fixed time interval of 5 minutes (e.g., the granule will contain all of the MODIS scans which start within a 5-minute interval), synchronized with the start of the Universal Time Coordinated (UTC) day. This results in 288 granules per day, of which 144 will be day mode.

The Land tiles are subsets of a global equal-area grid which is based on an Integerized Sinusoidal Projection. The V1 tiles are 10° x 10°, and the grid resolution within the tiles is 250m, 500m, or 1 km, depending on the product. The global grids used by Oceans, Atmosphere, and CMG products are either equal-area or equal-angle grids, with the resolution defined for each product.

1.3 System Structure

The MODIS SDP S/W is comprised of a collection of PGEs which run under control of the SDPS. The definitions of the PGEs and the data flows between them constitute a structure of the MODIS system, which can be discussed independently from the overall ECS environment. This structure has two overall drivers: the need to define PGEs to run the MODIS science data processes, and the interdependencies among the MODIS processes themselves. Each of these is discussed below, followed by a summary of the MODIS V1 PGEs.

1.3.1 Product Generation Executives

The PGE is a data processing concept which has been defined by ECS as part of the overall design of the SDPS. PGEs are described in detail in DID205, and much of this information is also summarized on the ECS Instrument Team (IT) Information WWW site (URL: <http://ecsinfo.hitc.com/iteams/iteams.html>). The characteristics of PGEs which influence the overall design of the MODIS system are summarized here.

A PGE is the smallest unit of science processing software which will be independently described, scheduled and executed within a DAAC. A PGE can be a single process, or

multiple processes controlled by a script. There are no specific limits on the number of processes within a PGE or the number of products produced, although DID205 does provide guidelines in these areas; the definition of individual PGEs is the responsibility of the ITs.

In addition to the processes which comprise a PGE, the ITs also define the conditions which must be met in order to activate each instantiation of the PGE. These conditions, which are codified within the DAAC as a set of Production Rules, define the specific data products which must be available in order for a PGE to run. The Production Rules will be registered with the DAACs as a part of the overall SSI&T process. In this document, the activation rules for each PGE will be summarized as part of the overall description of the PGE.

In addition to the general guidelines contained in ECS documentation, ECS has determined that the number of PGE executions at a DAAC should be limited to about 4000 per day. This constraint is imposed by the Autosys scheduling software, whose performance has been shown to degrade significantly when the number of executions rises much above this number. It is important for designing the PGEs which run at the GSFC DAAC, where the L1, L2, and L2G processing is performed. The number of executions at the GSFC DAAC would significantly exceed the limit if each process were run as a separate PGE. Therefore, some combining of processes in PGEs is indicated; this must be balanced against overall guidelines for minimizing the complexity of PGEs.

1.3.2 MODIS Process Dependencies

The order and timing of processing by individual MODIS science data processes is largely constrained by the MODIS products required as input for each process, and which in turn are produced by other MODIS processes. For example, MODIS L2 processes require L1B and Geolocation data as input; these products are generated by processes which require L1A data, whose production in turn depends on the availability of Level 0 data; in addition, several L2 processes require other L2 products as input. These dependencies define the overall data flow and structure of the MODIS system. (Note that several MODIS processes require products from earlier time periods as input; for purposes of the PGE design these dependencies were assumed to not affect the order or timing of the processing.)

The data dependencies of the MODIS V1 processes have been analyzed based on the process definitions provided by the individual scientists and developers. This information was used to determine which processes have common data needs, in terms of both products and time scales, and are therefore candidates for being combined into a single PGE.

1.3.3 MODIS Product Generation Executives

The MODIS V1 PGEs are summarized in Table 1-2. The table contains the following information for each PGE: an identification number; a descriptive name; the level of the products produced by the PGE; the DAAC where the PGE is run; the MODIS processes which comprise the PGE; the number of executions per day (or per longer time period if

the PGE does not run every day), and the processing period associated with the PGE. Each PGE is described in detail in Section 4.

Table 1-2. MODIS SDP S/W Product Generation Executives

ID	Name	Level	Site	Processes	Runs	Period
PGE1	Level 1A/Geolocation	1	GSFC	MOD_PR01, MOD_PR03	12	2 hr.
PGE2	Level 1B	1	GSFC	MOD_PR02	288	5 min.
PGE3	Masks/Profiles	2	GSFC	MOD_PRANC, MOD_PR35 MOD_PR07, MOD_PRVOLC	288	5 min.
PGE4	L2 Atmosphere	2	GSFC	MOD_PR05, MOD_PR04L, MOD_PR04S	144	5 min.
PGE5	L3 Interim Land Aerosol	2	GSFC	MOD_PR04LA	15	99 min.
PGE6	L2 Clouds	2	GSFC	MOD_PR06CT, MOD_PR06IR, MOD_PR06OD	288	5 min.
PGE7	L2 Snow	2	GSFC	MOD_PR10	144	5 min.
PGE8	L2 Sea Ice	2	GSFC	MOD_PR29	144	5 min.
PGE9	L2 Ocean Color	2	GSFC	MOD_PR18	144	5 min.
PGE10	L2 SST	2	GSFC	MOD_PR28	288	5 min.
PGE11	L2 Reflectance	2	GSFC	MOD_PR09	288	5 min.
PGE12A	L2G Pointers	2G	GSFC	MOD_PRMGPNTR	384	1 day
PGE12B	L2G Geolocation Angles	2G	GSFC	MOD_PRMGGA	384	1 day
PGE13	L2G Refl/Fire	2G	GSFC	MOD_PR09G, MOD_PR14G	338	1 day
PGE14	L2G Snow	2G	GSFC	MOD_PR10G	338	1 day
PGE15	L2G Sea Ice	2G	GSFC	MOD_PR29G	130	1 day
PGE16	L2 LST	2	GSFC	MOD_PR11A	1	1 day
PGE17	L3 Ocean Color	3	GSFC	MOD_msbin	144	5 min.
PGE18	Ocean Products	3	GSFC	MOD_PR27_Y	1	1 year
PGE19	L3 SST	3	GSFC	MOD_msbin	288	5 min.
PGE20	L3 Ocean Interim Daily	3	GSFC	MOD_mtbin	40	1 day
PGE21	L3 Fire Daily	3	EDC	MOD_PR14A	338	1 day
PGE22	L3 BRDF/Subset	3	EDC	MOD_PR43B1	338	1 day
PGE23	L3 BRDF/BARS	3	EDC	MOD_PR43B2	338	16 day
PGE25	L3 VI 8 day	3	EDC	MOD_PR13	338	8 day
PGE26	L3 VI 8 day CMG	3	EDC	MOD_PR13C	1	8 day
PGE27	L3 VI 16 day	3	EDC	MOD_PR13A	338	16 day
PGE28	L3 VI month	3	EDC	MOD_PR13B	338	32 day
PGE29	L3 Fire 8 day	3	EDC	MOD_PR14A	338	8 day
PGE30	L3 Fire 16 day	3	EDC	MOD_PR14A	338	16 day
PGE33	L3 LAI/FPAR Daily	3, 4	EDC	MOD_PR15A1, MOD_PR15A2	338	1 day
PGE34	L3 LAI/FPAR 8 day	4	EDC	MOD_PR15	338	8 day
PGE36	NPP ancillary	N/A	EDC	MOD_PR17P	1	1 day
PGE37	L3 NPP daily	4	EDC	MOD_PR17	338	1 day
PGE40	L3 Land Cover Monthly	3	EDC	MOD_PR12M	338	32 day
PGE41	L3 Land Cover Quarter	3	EDC	MOD_PR12Q	338	96 day
PGE43	L3 Snow Daily	3	NSIDC	MOD_PR10A	338	1 day

ID	Name	Level	Site	Processes	Runs	Period
PGE44	L3 Sea Ice Daily	3	NSIDC	MOD_PR29A	130	1 day
PGE45	L3 Snow 10 day	3	NSIDC	MOD_PR33	338	10 day
PGE47	L3 Sea Ice 10 day	3	NSIDC	MOD_PR42	130	10 day
PGE49	L3 Ocean Interim Weekly	3	GSFC	MOD_mtbin	40	8 day
PGE50	L3 Ocean Interim 3 week	3	GSFC	MOD_mtbin	40	8 day
PGE51	L3 Ocean 3 week Reference	3	GSFC	MOD_mfill	40	8 day
PGE53	L3 Ocean Daily	3	GSFC	MOD_mcloud	40	1 day
PGE54	L3 Ocean Weekly	3	GSFC	MOD_mtbin	40	8 day

Figure 1-3 illustrates the data flow among the PGEs. The figure was produced using Cadre's Teamwork CASE tool. It shows the inter-PGE dependencies for the MODIS SDP S/W, and the order in which the PGEs must be executed. Data stores are used to indicate flows which feed into several processes (e.g., L1, Profiles and Clouds) or which represent transfers between DAACs (e.g., Data for EDC). The figure does not show the additional sources of data required by the PGEs (e.g., ancillary data), the data flow to the product archives, or the specific number of each type of input product required; this information is included in the detailed PGE descriptions in Section 4.

1.4 Operational Scenario

The following sections will describe the environment, interfaces, and processing scenarios.

1.4.1 Environment

The MODIS SDP S/W is designed to run under control of the SDPS. The EOS Project has provided to the MODIS Science Data Support Team (SDST) a SDP Toolkit (SDPTK) that isolates the science software from hardware, system, and language interface library dependencies of the ECS SDPS environment. Any access to DAAC data staging areas to retrieve or store data is managed by an SDPTK call issued from the MODIS SDP S/W to the SDPS. The SDPTK is implemented in two versions: a Science Computing Facility (SCF) version, and an ECS SDPS version for use in the DAACs. The SDPTK provides a library of callable functions and subroutines including generic Input/Output (I/O), Status Message Facility (SMF), and Process Control File (PCF) support. The SDST has integrated the SDPTK into the Science Team Member (STM)-supplied software in preparation for delivery to the DAAC.

Figure 1-3. PGEs in the MODIS SDP S/W System

Figure 1-3 PGEs in the MODIS SDP S/W System (Continued)

Figure 1-3 PGEs in the MODIS SDP S/W System (Continued)

Figure 1-3. PGEs in the MODIS SDP S/W System (Continued)

1.4.2 Interfaces

The MODIS SDP S/W requires the following external data as input:

- MODIS Level 0 data, transmitted to the GSFC DAAC;
- Spacecraft data, transmitted to the GSFC DAAC and ingested by the SDPS;
- Ancillary data, both static and dynamic. The specific ancillary data required by each PGE are included with the PGE descriptions in Section 4. The sources of the ancillary data are either external data producers, such as the National Meteorological Center (NMC); or the software developers.

All of these data are acquired and archived at the DAACs. In addition, all MODIS processes beyond L1A require MODIS products as input. The specific data required for each PGE are staged by the SDPS for execution of the PGE.

The MODIS SDP S/W produces the following outputs:

- MODIS products, either standard, interim or temporary, which are archived and inventoried at the designated DAAC, as defined in the V1 Requirements Specification;
- QA products, which are transmitted to the appropriate SCF;
- Log status files and production histories that are saved in the processing log for each PGE run at the DAAC.

All of the outputs are managed by the SDPS following completion of each PGE.

1.4.3 Processing Scenarios

The following sections describe the processing scenarios for the MODIS L1, Atmosphere, Land, and Oceans PGEs.

1.4.3.1 Level 1 Processing Scenario

The MODIS L1 processing, performed at the GSFC DAAC, consists of L1A/Geolocation and L1B. This processing is initiated each time MODIS Level 0 data are received at the DAAC from EDOS.

The L1A process defines the processing granule size which is used by all subsequent L1 and L2 processing. A single Level 0 data delivery consists of 2 hours (nominally) of data, and so the L1A process produces 24 5-minute granules during a single execution. The Geolocation process within the same PGE inputs each L1A granule and produces corresponding 24 five-minute geolocation granules.

The L1B processing is then initiated using the L1A granules as input, one PGE execution per granule. These PGEs can run in parallel, within the available resources of the DAAC.

1.4.3.2 Atmosphere Processing Scenario

The MODIS Atmosphere processing in V1 is almost entirely L2, with the only exception being the generation of the L3 Interim Land Aerosol product. All Atmosphere processing is performed at the GSFC DAAC. The processing scenario is straightforward: each PGE is run once per granule, using other MODIS products as input.

The processing begins with L2 Masks/Profiles, which performs ancillary data preprocessing and processes each granule of L1B and Geolocation data. This is followed by L2 Atmosphere, which is performed only for day mode granules, and L2 Clouds, which is performed for every granule. Upon completion of a full day of processing, the L3 Interim Land Aerosol PGE is executed to produce the interim Land Aerosol product.

1.4.3.3 Ocean Processing Scenario

The Oceans Processing, performed at the GSFC DAAC, is organized around two overall product types: Ocean Color and Sea Surface Temperature (SST). The processing for the two product types differs at L2 but is essentially the same for all L3 products.

The initial Oceans processing is performed on one granule per PGE execution using L1B, geolocation, and cloud mask data as input. The L2 Ocean Color processing is performed for day mode granules only, while the L2 SST processing is performed for all granules. Both PGEs perform both L2 and the first stage of L3 processing, to produce L2 and granule-based L3 binned products.

The subsequent Oceans processing is performed to aggregate the L3 binned products over progressively longer time scales: orbit, day, 8-days, and 24 days. These steps are performed initially to produce a series of interim products. Following the generation of the 24-day interim products, the steps are repeated using these products and the interim daily products as input, to produce the standard L3 products.

1.4.3.4 Land Processing Scenario

The Land processing is the most complex, due to two factors: the tile-based processing for the L2G and L3 products; and the distribution of the processing among the three DAACs.

The L2 Land processing at the GSFC DAAC is similar to that for the other disciplines. The L2 Snow Cover and L2 Sea Ice PGEs are each executed once per day mode granule, while L2 Reflectance processing is performed for all granules using L1B, Geolocation, and L2 Atmosphere products as input.

The L2G processing, also at the GSFC DAAC, begins when all of the granules for one GMT day have been processed. All L2G PGEs are run once per tile; the inputs for an execution consist of all granules which overlap geographically with the specified tile, for the required MODIS products. The first step is L2G Pointers processing, which uses the

Geolocation product as input. This is followed by L2G Reflectivity/Fire, L2G Snow Cover and L2G Sea Ice, each of which use the L2G Pointers product for the specified tile and the corresponding L2 products for the overlapping granules as input. The Reflectivity/Fire and Snow Cover processing is performed for tiles which contain land, while the Sea Ice processing is performed for tiles at extreme latitudes. (The L2G Land Surface Temperature (LST) processing is also performed at this point, but the specific processing scenario is TBD at this time.)

At this point the L2G products are transferred to the appropriate DAAC for the L3 processing. The Reflectance, Fire and LST products are sent to the EDC DAAC, the Snow Cover and Sea Ice products are sent to the NSIDC DAAC, and the Pointer products are sent to both DAACs.

The L3 processing at NSIDC consists of the daily, 10-day and CMG processing for both Snow Cover and Sea Ice. The daily and 10-day processing is performed on a per tile basis, while the CMG processing is performed globally. The 10-day Snow Cover product is transmitted to the EDC DAAC for use in Land Cover Processing.

The L3 and Level 4 (L4) processing at EDC consists of separate processing streams for each product type. Each product is generated over progressively longer time scales (daily, 8-days, 16-days, etc.), both on a tile and global (CMG) basis.

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2. RELATED DOCUMENTATION

2.1 Parent Documents

- Team Leader Working Agreement for MODIS Between EOS AM & PM Projects GSFC and the MODIS Science Team Leader; GSFC 421-12-14-02; April 21, 1994.
- MODIS Science Data Processing Software System Version 1 Requirements Specification; SDST-028A, July 24, 1996.

2.2 Applicable Documents

- MODIS Version 1 Processing Files Descriptions; Review; SDST-061.
- MODIS Version 1 Science Software Integration and Test Procedures and Agreement with the GSFC DAAC; SDST-092; January 3, 1997.
- Science User's Guide and Operations Procedure Handbook for the EOS Core System (ECS) Project, Part 4: Software Developer's Guide to Preparation, Delivery, Integration, and Test with the ECS; 205-CD-002-003; Final, December 1996.

2.3 Informational Documents

- MODIS Software Management Plan; SDST-002, October 24, 1995.
- MODIS Data Management Plan; SDST-006, October 25, 1995.
- MODIS Software Development Standards and Guidelines; SDST-022C; January 17, 1997.
- M-API User's Guide, Version 2.0; SDST-064; August 21, 1996.
- MODIS Version 1 Team Leader Computing Facility Integration and Test Plan; SDST-068, July 1996.
- Data Production Software (DPS) and Science Computing Facility (SCF) Standards and Guidelines; October 1996.
- EOS Reference Handbook; 1996.
- Interface Control Document (ICD) Between EOSDIS Core System (ECS) and SCF, Revision A, (505-41-33).; September 1996.
- Release B SDPS/CSMS Design Specification Overview for the ECS Project; 305-CD-020-002; March 1996.
- SDP Toolkit User's Guide for the ECS Project; 333-CD-003-003; June 1996.
- Science Data Processing Segment (SDPS) Database Design and Database Schema Specification for the ECS Project; 311-CD-002-002; May 1996.

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3. SCIENCE DATA PRODUCTS AND PROCESSING FILES

An overview of the MODIS data products and the parameters they contain, is presented in the MODIS Data Product Catalog, found on the MODIS Administrative Support Team (MAST) World Wide Web (WWW) site at URL:

<http://modarch.gsfc.nasa.gov/MODIS/DATAPROD/dataprodcatalog.html>.

For the scientific derivation of each product, consult the Algorithm Theoretical Basis Document (ATBD) for each product, located on the SPSO WWW at URL:

<http://eospso.gsfc.nasa.gov/atbd/modistables.html>.

Table 3-1 shows the MODIS products and their mapping to the ATBDs.

Table 3-1. Mapping of MODIS ATBD Versus Product Numbers

Product #	ATBD #
MOD-01	N/A
MOD-02	ATBD-MOD-01
MOD-03	ATBD-MOD-29
MOD-04	ATBD-MOD-02
MOD-05	ATBD-MOD-03
MOD-06	ATBD-MOD-04
MOD-06	ATBD-MOD-05
MOD-07	ATBD-MOD-07
MOD-08	ATBD-MOD-07
MOD-09	ATBD-MOD-08
MOD-10	ATBD-MOD-11
MOD-11	ATBD-MOD-12
MOD-12	ATBD-MOD-13
MOD-13	ATBD-MOD-14
MOD-14	ATBD-MOD-15
MOD-15	ATBD-MOD-16
MOD-17	ATBD-MOD-17
MOD-18	ATBD-MOD-18
MOD-19	ATBD-MOD-19
MOD-20	ATBD-MOD-23
MOD-21	ATBD-MOD-19
MOD-21	ATBD-MOD-20
MOD-22	ATBD-MOD-21
MOD-23	ATBD-MOD-19
MOD-24	ATBD-MOD-19
MOD-25	ATBD-MOD-24
MOD-26	ATBD-MOD-19
MOD-27	ATBD-MOD-25
MOD-28	ATBD-MOD-26
MOD-29	ATBD-MOD-11

Product #	ATBD #
MOD-30	ATBD-MOD-07
MOD-31	ATBD-MOD-28
MOD-32	ATBD-MOD-27
MOD-33	ATBD-MOD-11
MOD-35	ATBD-MOD-06
MOD-36	ATBD-MOD-20
MOD-37	ATBD-MOD-18
MOD-38	ATBD-MOD-07
MOD-39	ATBD-MOD-22
MOD-42	ATBD-MOD-22
MOD-43	ATBD-MOD-11

The full details of the structure, size, and characteristics of every file produced or utilized by the MODIS SDP S/W are provided in the MODIS Processing Files Description Document.

Each file or group of files has been assigned an Earth Science Data Type (ESDT) designation by the ECS Project in cooperation with the MODIS SDST. The MODIS V1 ESDTs are listed in Table 3-2, along with a description, file type, file name, and the MODIS process associated with the ESDTs. The file types include P (product), S (static, e.g., look-up-table), D (dynamic ancillary data), Q (quality control or diagnostic output), and T (temporary). The file names consist of a complete name for all but MODIS products. The name for each MODIS product ESDT has an asterisk (representing the common prefix of MOD.AM1.V1) and the unique mnemonic for the product (as listed in the V1 Software Delivery Guide). The ESDTs will be used in the remainder of the document for all references to processing files.

Table 3-2. MODIS ESDTs for V1

[illegible]

ESDT	Description	File Type	File Name	Associated Process
MOD05LUW	MODIS Weight Factors Lookup Table for Production of MOD05	S	WEIGHT_TABLE	MOD_PR05
MOD05_L2	MODIS total precipitable Water vapor test results	P	*.pw_nir.L2	MOD_PR05
MOD05_QC	MOD_PR05 diagnostic File	Q	mod05.qc	MOD_PR05
MOD06LUA	MODIS Cloud Optical Depth Lookup Tables for Production of MOD06	S S S S S S S S S	inf_V1.dat flux_ts040.dat flux_ts080.dat flux_ts120.dat flux_tsinf.dat relf_ts040.B refl_ts080.B relf_ts120.B relf_tsinf.B	MOD_PR06OD
MOD06LUB	MODIS Binary Input Radiative Transfer Lookup Tables for Production of MOD06	S S	mod06_input.dat modistcf	MOD_PR06CT
MOD06_QC	MOD_PR06IR diagnostic file	Q	irphase.output	MOD_PR06IR
MOD07LUT	MODIS Temperature and Water Vapor Profile Inversion Coefficients for Production of MOD07	S S	modisges.trc modisges.wrc	MOD_PR07
MOD07_L2	Joint Atmosphere Product of Profiles, Total Column Ozone, Water Vapor, and Stability Indices	P	*.profiles.L2	MOD_PR07
MOD09	MODIS Land Surface Reflectance	P	*.srefl_vi	MOD_PR09
MOD092SR	MODIS Level 2G, 250-m Surface Reflectances	P	*.ref250.L2G	MOD_PR09G
MOD095SR	MODIS Level 2G, 500-m Surface Reflectances	P	*.ref500.L2G	MOD_PR09G
MOD09LU1	MODIS Aerosol Transmittance Lookup Tables for Production of MOD09	S S S S S S S S S S	SraTable kernalb brdf_coef0.data brdf_coef1.data AeroTrans.0469 AeroTrans.0547 AeroTrans.0664 AeroTrans.0875 AeroTrans.1240 AeroTrans.1640 AeroTrans.2142	MOD_PR09

ESDT	Description	File Type	File Name	Associated Process
MOD09LU2	MODIS Concentration Lookup Tables for Production of MOD09	S S S S S S S S	Con0469 Con0547 Con0664 Con0875 Con1240 Con1640 Con2142 1994-06-30I	MOD_PR09
MOD09LU3	MODIS Various Lookup Tables for Production of MOD09	S S S S S S S S S S S S	all.refldisord.1 all.refldisord.2 ozone.dat ANC_OORT_WV.CLIMATOLOGY all.rhobar.1 all.rhobar.2 all.rho2bar.1 all.rho2bar.2 biome.in surface_pres.mbars spres_2x2.5.mbars DAOWV_01AUG93 DAOSP_01AUG93	MOD_PR09
MOD10A1	MODIS Level 3, Daily Gridded Snow Cover Product	P	*.snow_dy.L3	MOD_PR10A
MOD10L2G	MODIS L2G Snow Cover	P	*.snow.L2G	MOD_PR10G
MOD10_L2	Snow Cover	P	*.snow.L2	MOD_PR10
MOD11D3	MODIS Level 3 Daily Land Surface Temperature and Emissivity	P	*.lst_dy.L3	MOD_PR11A
MOD11D35	MODIS Level 3 Daily 5 km Land Surface Temperature and Emissivity	P	*.lst_dy_5km.L3	MOD_PR11A
MOD11LCV	Land cover input files for MOD11	S		MOD_PR11A
MOD11LUW	MODIS Land Surface Temperature Split Window Lookup Table for Production of MOD11	S S S	sol_term_tbls tir_term_tbls f_bin2_1	MOD_PR11A
MOD11_L2	MODIS Land Surface Temperature and Emissivity	P	*.lst.L2	MOD_PR11A
MOD11UPD	MOD11 running update files	P		MOD_PR11A
MOD12LUT	MODIS Lookup Tables for Production of MOD12	S	q_weights31 q_features q_anc_dem	MOD_PR12Q
MOD12Q3	MODIS Level 3, Quarterly Land Cover Type Product	P	*.landcov_96dy.L3	MOD_PR12Q
MOD12_1M	MODIS Level 3, Monthly Land Cover Database for Production of MOD12	P	*.landcov_32dy.L3	MOD_PR12M

ESDT	Description	File Type	File Name	Associated Process
MOD13E3	MODIS Level 3, 8-Day Vegetation Indices Product	P	*.v1_8dy.L3	MOD_PR13
MOD13EC	MODIS Climate Modeling Grid, 8-Day Vegetation Indices Product	P	*.v1_8dy_cmg.L3	MOD_PR13C
MOD13M3	MODIS Level 3, Monthly Vegetation Indices Product	P	*.vi_32_dy.L3	MOD_PR13B
MOD13S3	MODIS Level 3, 16-Day Vegetation Indices Product	P	*.vi_16dy.L3	MOD_PR13A
MOD14	MODIS Thermal Anomaly/Fire	P	*.fire.L2	MOD_PR09
MOD14D3	MODIS Level 3 Daily Gridded Thermal Anomalies Product	P	*.fire_1day.L3	MOD_PR14A
MOD14E3	MODIS Level 3, 8-Day Gridded Thermal Anomalies Product	P	*.fire_8day.L3	MOD_PR14A
MOD14L2G	MODIS Level 2G Thermal Anomalies Product	P	*.fire.L2G	MOD_PR14G
MOD14M3	MODIS Level 3, Monthly Gridded Thermal Anomalies Product	P	*.fire_32day.L3	MOD_PR14A
MOD14S3	MODIS Level 3, 16-Day Gridded Thermal Anomalies Product	P	*.fire_16day.L3	MOD_PR14A
MOD15D3	MODIS Level 3, Daily Leaf Area Index and FPAR Product	P	*.laif_par_dy.L3	MOD_PR15A1
MOD15D4	MODIS Level 4, Daily Leaf Area Index and FPAR Product	P	*.laif_par_dy.L4	MOD_PR15A2
MOD15E4	MODIS Level 4, 8-Day Leaf Area Index and FPAR Product	P	*.laif_par_8dy.L4	MOD_PR15
MOD15LUT	MODIS Lookup Tables for Production of MOD15	S		MOD_PR15A2
MOD17D4	MODIS Interim Gross Primary Productivity for Production of MOD17	P	*.gpp_dy.L4	MOD_PR17
MOD17E4	MODIS Level 4, 8-Day Photosynthesis-Respiration and NPP Database for Production of MOD17	P	*.npp_8dy.L4	MOD_PR17
MOD17LUT	MODIS Lookup Tables for Production of MOD17	S		MOD_PR17
MOD17P	Interim Composited DAO Climatology	P		MOD_PR17P
MOD17Y4	MODIS Level 4, Yearly Net Primary Production Product	P	*.npp_yr.L4	MOD_PR17
MOD27Y3	MODIS Level 3, Yearly Global Oceans Productivity Product	P	*.oppyr_yr.L3	MOD_PR27_Y
MOD28AD1	MODIS Level 3, Daytime Daily Composite for Production of MOD28, Parameter 1	P	*.sst_d1_int_dy.L3	MOD_mtbin

ESDT	Description	File Type	File Name	Associated Process
MOD28AD2	MODIS Level 3, Daytime Daily Composite for Production of MOD28, Parameter 2	P	*.sst_d2_int_dy.L3	MOD_mtbin
MOD28AN1	MODIS Level 3, Nighttime Daily Composite for Production of MOD28, Parameter 1	P	*.sst_n1_int_dy.L3	MOD_mtbin
MOD28AN2	MODIS Level 3, Nighttime Daily Composite for Production of MOD28, Parameter 2	P	*.sst_n2_int_dy.L3	MOD_mtbin
MOD28AVH	MODIS SST AVHCH files	S S S S S S	avhch1pol.dat avhch2pol.dat avhch1pol.new avhch2pol.new avhch1pol.bin avhch2pol.bin	MOD_PR28
MOD28BD1	MODIS Space Binned Daytime Sea Surface Temperatures for Production of MOD28, Parameter 1	P	*.sst_d1_int_p.L3	MOD_msbin
MOD28BD2	MODIS Space Binned Daytime Sea Surface Temperatures for Production of MOD28, Parameter 2	P	*.sst_d2_int_p.L3	MOD_msbin
MOD28BN1	MODIS Space Binned Nighttime Sea Surface Temperatures for Production of MOD28, Parameter 1	P	*.sst_n1_int_p.L3	MOD_msbin
MOD28BN2	MODIS Space Binned Nighttime Sea Surface Temperatures for Production of MOD28, Parameter 2	P	*.sst_n2_int_p.L3	MOD_msbin
MOD28DD1	MODIS Level 3, Daytime Daily QCed Sea Surface Temperature Product, Parameter 1	P	*.sst_d1_dy.L3	MOD_mcloud
MOD28DD2	MODIS Level 3, Daytime Daily QCed Sea Surface Temperature Product, Parameter 2	P	*.sst_d2_dy.L3	MOD_mcloud
MOD28DN1	MODIS Level 3, Nighttime Daily QCed Sea Surface Temperature Product, Parameter 1	P	*.sst_n1_dy.L3	MOD_mcloud
MOD28DN2	MODIS Level 3, Nighttime Daily QCed Sea Surface Temperature Product, Parameter 2	P	*.sst_n2_dy.L3	MOD_mcloud
MOD28ED1	MODIS Level 3, Daytime Weekly Composite for Production of MOD28, Parameter 1	P	*.sst_d1_int_wk.L3	MOD_mtbin
MOD28ED2	MODIS Level 3, Daytime Weekly Composite for Production of MOD28, Parameter 2	P	*.sst_d2_int_wk.L3	MOD_mtbin
MOD28EN1	MODIS Level 3, Nighttime Weekly Composite for Production of MOD28, Parameter 1	P	*.sst_n1_int_wk.L3	MOD_mtbin

ESDT	Description	File Type	File Name	Associated Process
MOD28EN2	MODIS Level 3, Nighttime Weekly Composite for Production of MOD28, Parameter 2	P	*.sst_n2_int_wk.L3	MOD_mtbin
MOD28FD1	MODIS Level 3, Daytime 3-Week Composite for Production of MOD28, Parameter 1	P	*.sst_d1_int_3wk.L3	MOD_mtbin
MOD28FD2	MODIS Level 3, Daytime 3-Week Composite for Production of MOD28, Parameter 2	P	*.sst_d2_int_3wk.L3	MOD_mtbin
MOD28FN1	MODIS Level 3, Nighttime 3-Week Composite for Production of MOD28, Parameter 1	P	*.sst_n1_int_3wk.L3	MOD_mtbin
MOD28FN2	MODIS Level 3, Nighttime 3-Week Composite for Production of MOD28, Parameter 2	P	*.sst_n2_int_3wk.L3	MOD_mtbin
MOD28L2	MODIS Level 2 Sea Surface Temperatures Product	P	*.sst.L2	MOD_PR28
MOD28LUT	MODIS SST generic input files	S S S	pathnrc_coeffs.dat emissivity.dat spectra.dat	MOD_PR28
MOD28QA	MODIS Level 2 Sea Surface Temperatures QA	P	*.sst_qc.L2	MOD_PR28
MOD28RD1	MODIS Level 3, Daytime Weekly Sea Surface Temperatures Reference Field for Production of MOD28, Parameter 1	P	*.sst_d1_3wk.L3	MOD_mtbin MOD_mfill
MOD28RD2	MODIS Level 3, Daytime Weekly Sea Surface Temperatures Reference Field for Production of MOD28, Parameter 2	P	*.sst_d2_3wk.L3	MOD_mtbin MOD_mfill
MOD28REF	MODIS SST reference image	S	oi.mean.bias.940630	MOD_PR28
MOD28RN1	MODIS Level 3, Nighttime Weekly Sea Surface Temperatures Reference Field for Production of MOD28, Parameter 1	P	*.sst_n1_3wk.L3	MOD_mtbin MOD_mfill
MOD28RN2	MODIS Level 3, Nighttime Weekly Sea Surface Temperatures Reference Field for Production of MOD28, Parameter 2	P	*.sst_n2_3wk.L3	MOD_mtbin MOD_mfill
MOD28WD1	MODIS Level 3, Daytime Weekly QCed Sea Surface Temperature Product, Parameter 1	P	*.sst_d1_wk.L3	MOD_mtbin
MOD28WD2	MODIS Level 3, Daytime Weekly QCed Sea Surface Temperature Product, Parameter 2	P	*.sst_d2_wk.L3	MOD_mtbin
MOD28WN1	MODIS Level 3, Nighttime Weekly QCed Sea Surface Temperature Product, Parameter 1	P	*.sst_n1_wk.L3	MOD_mtbin

ESDT	Description	File Type	File Name	Associated Process
MOD28WN2	MODIS Level 3, Nighttime Weekly QCed Sea Surface Temperatures Product, Parameter 2	P	*.sst_n2_wk.L3	MOD_mtbm
MOD29	MOD29 L2 SEAICE COVER GRANULE	P	*.seaice_max.L2	MOD_PR29
MOD29D3	MODIS Level 3, Daily Gridded Sea Ice Maximum Extent Product	P	*.seaice_max_dy.L3	MOD_PR29A
MOD29DG	MODIS Level 2G, Daily Sea Ice Maximum Extent Product	P	*.seaice_max.L2G	MOD_PR29G
MOD33T3	MODIS Level 3, 10-Day Gridded Snow Cover Product	P	*.snow_10dy.L3	MOD_PR33
MOD35ANC	EDC Land/Sea Mask Olson World Ecosystem Map	S S	eroslst.new1km ecosystem.img	MOD_PR35
MOD35_L2	MODIS Cloud Mask and Spectral Test Results	P	*.cldmask.L2	MOD_PR35
MOD35_QC	MOD35 ASCII output file	Q	runtime.output	MOD_PR35
MOD42T3	MODIS Level 3, 10-Day Gridded Sea Ice Cover Product	P	*.seaice_10dy.L3	MOD_PR42
MOD43A1	MODIS Level 3, 16-Day Bi-Directional Reflectance Distribution Function and Albedo Product	P	*.brdf_16dy.L3	MOD_PR43B2
MOD43A2	MODIS BRDF Adjusted Surface Reflectance Lookup Table for Production of MOD43	P	*.bars_16dy.L3	MOD_PR43B2
MOD43A3	MODIS Level 3, BRDF Preprocessing Database	P	*.brdfsubs.L3	MOD_PR43B1
MOD43A4	MODIS Level 3, BRDF Texture Database for Production of MOD43	P	*.texture_16dy.L3	MOD_PR43B1
MOD43LUA	MODIS BRDF Surface Albedo Lookup Table for Production of MOD43	S	ambrals.albedos	MOD_PR43B2
MOD43LUP	MODIS BRDF Reference Map Database for Production of MOD43	S	brdf.refmap.database	MOD_PR43B2
MOD43LUT	MODIS BRDF Lookup Table for Production of MOD43	S	ambrals.models.info	MOD_PR43B2
MOD4L_L2	MODIS Level 2 Aerosol Over Land Product	P	*.aerland.L2	MOD_PR04L
MOD4L_O	MODIS Level 3, 18-km, Daily Orbit Product	P		MOD_PR04LA
MOD4S_L2	MODIS Level 2 Aerosol Over Oceans Product	P	*.aersea.L2	MOD_PR04S
MOD6CTL2	MODIS Level 2 Cloud Top Properties and IR Phases Product	P	*.cld_top.L2	MOD_PR06CT, MOD_PR06IR
MOD6ODL2	Cloud Optical Thickness and Effective Cloud Particle Radius	P	*.cld_opt.L2	MOD_PR06OD

ESDT	Description	File Type	File Name	Associated Process
MODANCAV	NCEP aviation data file	D	gblav.T00Z.PGrbF00	MOD_PRANC
MODANCCF	MOD_PRANC Control File	S	unpkgrb1.dat	MOD_PRANC
MODANCL2	MODIS Level 2 Atmosphere Ancillary Data	P	*.atmos_anc	MOD_PRANC
MODANCOZ	NCEP total ozone data file	D	960214.grb	MOD_PRANC
MODANCQC	global NCEP ancillary HDF file	T	*.glb_anc.L2	MOD_PRANC
MODANCQC	aviation data dianostic file, ozone data diagnostic file	Q	unpkgrb1_avi.log, unpkgrb1_ozn.log	MOD_PRANC
MODANCST	Reynolds SST data file	D	oi.mean.bias.960214	MOD_PRANC
MODGA	MODIS Level 2G Geolocation Angles	P	*.geoang.L2G	MOD_PRMGGA
MODOCA01	MODIS Level 3, Daily Composite of Parameter 1 for Production of MODOC	P		MOD_mtbins
MODOCAER	MODIS Ocean Color aerosol coefficients	S S S S S S S S	seawifs_aerosol_412.dat seawifs_aerosol_443.dat seawifs_aerosol_490.dat seawifs_aerosol_510.dat seawifs_aerosol_555.dat seawifs_aerosol_670.dat seawifs_aerosol_765.dat seawifs_aerosol_865.dat	MOD_PR18
MODOCB01	MODIS Space Binned Parameter 1 for Production of MODOC	P		MOD_msbins
MODOCB36	MODIS Space Binned Parameter 36 for Production of MODOC	P		MOD_msbins
MODOCD01	MODIS Level 3, QCed Daily Composite of Parameter 1 for Production of MODOC	P		MOD_mcloud
MODOCE01	MODIS Level 3, Weekly Composite of Parameter 1 for Production of MODOC	P		MOD_mtbins
MODOCF01	MODIS Level 3, 3-week Composite of Parameter 1 for Production of MODOC	P		MOD_mtbins
MODOCL2	MODIS Level 2 Ocean Color Water Leaving Radiance Product	P	ocncolor_w.L2	MOD_PR18
MODOCL2A	MODIS Level 2 Ocean Color Derived Products Group 1 Product	P	ocncolor_dr1.L2	MOD_PR18
MODOCL2B	MODIS Level 2 Ocean Color Derived Products Group 2 Product	P	ocncolor_dr2.L2	MOD_PR18
MODOCLU1	MODIS Ocean Color coefficients	S	coef_a_b_NNN.dat, NNN=000, 025, ... 800	MOD_PR18

ESDT	Description	File Type	File Name	Associated Process
MODOCLU2	MODIS Ocean Color linear coefficients	S	coef_linear_19_NNN.dat, NNN=000, 025, ... 800	MOD_PR18
MODOCLU3	MODIS Ocean Color quad coefficients	S	coef_quad_19_NNN.dat, NNN=000, 025, ... 800	MOD_PR18
MODOCLU4	MODIS Ocean Color quad4 coefficients	S	coef_quad_four_NNN.dat, NNN=000, 025, ... 800	MOD_PR18
MODOCLUT	MODIS Ocean Color generic input files	S S S S S S S S S S S S S S S	coccolith_tables.dat seawifsdob.cal seawifsaer.cal seawifssf0.cal seawifslcw.cal carder_params2.dat sea412pol.new sea443pol.new sea490pol.new sea510pol.new sea555pol.new sea670pol.new sea765pol.new sea865pol.new	MOD_PR18
MODOCMSK	MODIS Oceans processing land and shallow water masks	S S	global_land_7.p04bit-180.hdf global_bath_0to30.p04bit-180.hdf	MOD_PR18, MOD_PR28
MODOCNM C	NMC ancillary data for MODIS Oceans processing	D	MODyyyydddh_NMC.MET, yyyy=year, ddd=day, hh=hour	MOD_PR18, MOD_PR28
MODOCQC	MODIS Level 2 Ocean Color QC for Production of MODOC	Q	ocncolor_qc.L2	MOD_PR18
MODOCR01	MODIS Level 3, Weekly Parameter 1 Reference Field for Production of MODOC	P		MOD_mtbin MOD_mfill
MODOCTOV	TOVS ozone data for MODIS Oceans processing	D	MODyyyydddh_TOVS.OZONE, yyyy=year, ddd=day, hh=hour	MOD_PR18, MOD_PR28
MODOCW01	MODIS Level 3, QCed Weekly Composite of Parameter 1 for Production of MODOC	P		MOD_mtbin
MODPT1KM	MODIS Level 2G, 1-km Pointer File	P	*.pntr_1km.L2G	MOD_PRMGPN TR
MODPT25M	MODIS Level 2G, 250-m Pointer File	P	*.pntr_250m.L2G	MOD_PRMGPN TR
MODPT5M	MODIS Level 2G, 500-m Pointer File	P	*.pntr_500m.L2G	MOD_PRMGPN TR
MODVOLC	MODIS Volcano Alert File	Q	*.volc.L2	MOD_PRVOL C

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4. PRODUCT GENERATION EXECUTIVES

For each PGE, the following information is provided: purpose of the PGE, (i.e., which products are produced); the PGE structure, including both a brief description of the processes and a data flow diagram; the ESDTs for the input and output files for each process in the PGE; and a summary of the activation rules for the PGE. Detailed descriptions of the files can be found in the MODIS Processing Files Description Document.

4.1 Level 1A/Geolocation (PGE01)

PGE01 represents the MODIS Level 1A (L1A) processing, which is done on a semi “real-time” basis with each Level 0 input file containing two hours of data. This results in twelve executions of this PGE per day executed at GSFC.

Purpose

PGE1 converts the raw (Level 0) data into reconstructed earth-located instrument data.

Structure

PGE01 is comprised of two sequential processing steps: L1A processing (MOD_PR01) and geolocation processing (MOD_PR03). L1A unpacks and reformats the Level 0 data. Geolocation earth-locates the 1km observations. Figure C-1 shows the structure of PGE01.

Data Files

With the exception of static processing (ancillary) files, the only data needed for processing is the raw (Level 0) MODIS instrument data in two hour increments. The output files are divided into smaller (5 minute) granules, resulting in approximately 24 files per execution.

Process	Input	Output	Temporary
MOD_PR01	MOD00	MOD01	none
MOD_PR03	MOD01, MOD03LUT, MOD03DEM	MOD03	none

Activation Rules

PGE1 is data driven. It is executed when new Level 0 data are available approximately every two hours. There are no other dependencies.

4.2 Level 1B (PGE02)

PGE02 performs the MODIS Level 1B (L1B) processing, which runs on a per-granule basis after PGE01 processing is executed at GSFC.

Purpose

PGE02 converts the raw (L1A) detector counts into fully calibrated radiances.

Structure

PGE02 consists of a single processing step: L1B, which converts the raw counts into radiances. Figure C-2 shows the structure of PGE02.

Data Files

Process	Input	Output	Temporary
MOD_PR02	MOD01, MOD02LUT	MOD02, MOD02QC	none

Activation Rules

PGE02 is executed once for each granule of MOD01 produced by PGE01. It requires three granules of MOD01 data (previous, current, following) as input. The total number of executions is 288 per day.

4.3 Masks/Profiles (PGE03)

PGE03 is the first step in the L2 processing of the MODIS data. It consists of some atmospheric processes, which produce products needed by other MODIS L2 processes, and is executed at GSFC.

Purpose

PGE03 produces atmospheric products needed by other MODIS processes; namely, cloud mask (MOD35) and Joint Atmosphere Product (MOD07_L2). It also generates the volcano alert message file that should be distributed to the original SCF for analysis.

Structure

PGE03 consists of four processes; atmosphere ancillary preprocessing (MOD_PRANC), atmospheric products (MOD_PR07), cloud mask (MOD_PR35) and volcano alert (MOD_PRVOLC). Figure C-3 shows the structure of PGE03.

Data Files

Process	Input	Output	Temporary
MOD_PRANC	MOD03, MODANCCF, MODANCAV, MODANCOZ, MODANCST	MODANCL2, MODANCQC	Temporary ancillary files (~40 Mbytes total)
MOD_PR35	MOD02, MOD03, MODANCL2, MOD35ANC	MOD35_L2, MOD35_QC	Clear Sky radiance files (~1.5 Gbytes total)
MOD_PR07	MOD02, MOD03, MOD35_L2, MODANCL2, MOD07LUT	MOD07_L2	none
MOD_PRVOLC	MOD02, MOD03	MODVOLC	none

Activation Rules

PGE03 runs once for each MODIS granule. The primary input requirements are MOD03 and MOD02. However, it is also dependent upon ancillary files that must be available before processing begins. The operational scenario is 288 activations per day representing the processing of one granule per PGE.

4.4 Level 2 Atmosphere (PGE04)

PGE04 represents the second step in the atmosphere L2 processing executed at GSFC.

Purpose

PGE04 produces some day-only atmosphere products required by other MODIS L2 processes; namely, aerosol, and precipitable water.

Structure

PGE04 is comprised of three sequential processing steps: precipitable water (MOD_PR05), land aerosol (MOD_PR04L), and sea aerosol (MOD_PR04S). Figure C-4 shows the structure of PGE04.

Data Files

Process	Input	Output	Temporary
MOD_PR05	MOD02, MOD03, MOD35_L2, MODANCL2, MOD05LUR, MOD05LUW	MOD05_L2, MOD05_QC	none
MOD_PR04L	MOD02, MOD03, MOD35_L2, MOD05_L2, MOD07_L2, MOD04LUT, MODANCL2	MOD4L_L2	none

MOD_PR04S	MOD02, MOD03, MOD35_L2, MOD05_L2, MOD07_L2, MODANCL2, MOD04LUT	MOD4S_L2, MOD4S_QC	none
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Activation Rules

PGE04 runs once for each MODIS day-mode granule. The primary input requirements are MOD03, MOD02 MOD07_L2 and MOD35_L2 from PGE03. The operational scenario is 144 activations per day representing the processing of one day mode granule per PGE.

4.5 Level 3 Interim Land Aerosol (PGE50)

PGE05 consists of L3 Land Aerosol interim processing at GSFC.

Purpose

PGE05 produces the L3 Land Aerosol interim product.

Structure

PGE05 consists of the L3 Land Aerosol interim process (MOD_PR04LA). Figure C-5 shows the structure of PGE05.

Data Files

Process	Input	Output	Temporary
MOD_PR04LA	MOD4L_L2	MOD4L_0	none

Activation Rules

PGE05 runs when a full orbit of PGE04 processing has completed. The operations scenario is one activation per orbit.

4.6 Level 2 Clouds (PGE06)

PGE06 is the third step in the atmosphere L2 processing of the MODIS data executed at GSFC

Purpose

PGE06 produces cloud products which depend upon previously generated L2 products. The products are cloud optical depth (MOD6ODL2) and cloud top properties and IR phases (MOD6CTL2).

Structure

PGE06 consists of three processes; cloud top properties (MOD_PR06CT), cloud optical depth (MOD_PR06OD) and cloud IR phases (MOD_PR06IR). Figure C-6 shows the structure of PGE06.

Data Files

Process	Input	Output	Temporary
MOD_PR06CT	MOD35_L2, MOD02, MOD03, MODANCL2, MOD06LUB	MOD6CTL2	none
MOD_PR06IR	MOD02, MOD35_L2, MOD03, MOD6CTL2, MODANCL2	MOD6CTL2, MOD06_QC	none
MOD_PR06OD	MOD02, MOD03, MOD35_L2, MOD06LUA	MOD6ODL2	none

Activation Rules

PGE06 runs once per MODIS granule. The primary inputs are MOD02, MOD03, MODANCL2, and MOD35_L2. The operational scenario is 288 activations per day representing the processing of one granule per PGE.

4.7 Level 2 Snow (PGE07)

PGE07 is a part of the land L2 processing. It produces the L2 Snow Cover product at GSFC.

Purpose

PGE07 produces the L2 Snow Cover product (MOD10_L2), which is a day-only land product.

Structure

PGE07 is comprised of a single processing step, Snow Cover (MOD_PR10). Figure C-7 shows the structure of PGE07.

Data Files

Process	Input	Output	Temporary
MOD_PR10	MOD02, MOD03	MOD10_L2	none

Activation Rules

PGE07 runs once for each MODIS day-mode granule. The input requirements are MOD03 and MOD02. The operational scenario is 144 activations per day representing the processing of one DAY mode granule per PGE.

4.8 Level 2 Sea Ice (PGE08)

PGE08 is the land L2 sea ice process executed at GSFC.

Purpose

PGE08 produces the L2 sea ice product (MOD29).

Structure

PGE08 consists of the sea ice processing (MOD_PR29). Figure C-8 shows the structure of PGE08.

Data Files

Process	Input	Output	Temporary
MOD_PR29	MOD02, MOD03	MOD29	none

Activation Rules

PGE08 runs once for each MODIS day-mode granule. The input requirements are MOD03 and MOD02. The operational scenario is 144 activations per day representing the processing of one DAY mode granule per PGE.

4.9 Level 2 Ocean Color (PGE09)

PGE09 is the first step in the ocean L2 processing of the MODIS data executed at GSFC.

Purpose

PGE09 produces the MODIS ocean-color L2 products.

Structure

PGE09 consists of the Ocean Color L2 processing. Figure C-9 shows the structure of PGE09.

Data Files

Process	Input	Output	Temporary
MOD_PR18	MOD02, MOD03, MOD35_L2, MODOCNMC, MODOCTOV, MODOCMSK, MODOCLUT, MODOCLU1, MODOCLU2, MODOCLU3, MODOCLU4, MODOCAER	MODOCL2, MODOCL2A, MODOCL2B, MODOCQC	none

Activation Rules

PGE09 runs once for each MODIS day-mode granule. The input requirements are MOD02, MOD03, and MOD35_L2. PGE09 is also dependent upon ancillary files that must be available before processing begins. The operational scenario is 144 activations per day representing the processing of one day-mode granule per PGE.

4.10 Sea Surface Temperature (PGE10)

PGE10 consists of the ocean L2 SST process executed at GSFC.

Purpose

PGE10 produces the SST product (MOD28_L2).

Structure

PGE10 consists of the sea surface temperature L2 processing (MOD_PR28). Figure C-10 shows the structure of PGE10.

Data Files

Process	Input	Output	Temporary
MOD_PR28	MOD35_L2, MOD02, MOD03, MODOCNMC, MODOCTOV, MODOCMSK, MOD28REF, MOD28LUT, MOD28AVH	MOD28L2	none

Activation Rules

PGE10 runs once for each MODIS granule. The primary input requirements are MOD02, MOD03, and MOD35_L2. PGE10 is also dependent upon ancillary files that must be available before processing begins. The operational scenario is 288 activations per day representing the processing of one granule per PGE.

4.11 Level 2 Reflectance (PGE11)

PGE11 performs land L2 processing at GSFC.

Purpose

PGE11 produces land L2 products, namely surface reflectance (MOD09) and thermal anomalies (MOD14).

Structure

PGE11 consists of a single process (MOD_PR09). Figure C-11 shows the structure of PGE11.

Data Files

Process	Input	Output	Temporary
MOD_PR09	MOD02, MOD03, MOD35_L2, MOD05_L2, MOD09LU1, MOD09LU2, MOD09LU3	MOD09, MOD14	none

Activation Rules

PGE11 runs once for each MODIS granule. The primary input requirements are MOD03, MOD02, MOD35_L2, and MOD05_L2. The operational scenario is 288 activations per day representing the processing of one granule per PGE.

4.12 Level 2G Pointers (PGE12A and PGE12B)

PGE12A and PGE12B support the L2G land products executed at GSFC. (This originally was designed as a single PGE but was divided into two PGEs due to a SDP Toolkit problem.)

Purpose

PGE12A and PGE12B produce some of the files required for L2G and L3 land processing, namely the L2G pointer map (MODMGPNTR) and the tiled geolocation angular data (MODMGGA).

Structure

PGE12A consists of the L2G pointer map process (MOD_MGPNTR). PGE12B consists of and the tiled geolocation angular data process (MOD_PRMGGA). Figure C-12 shows the structure of PGE12A and PGE12B.

Data Files

Process	Input	Output	Temporary
MOD_PRMGPNTR	MOD03	MODPT1KM, MODPT5KM, MODPT25KM	none
MOD_PRMGGA	MOD03, MODPT1KM	MODGA	none

Activation Rules

PGE12A runs once per tile per day, after a full day of PGE01 processing has completed. PGE12B also runs once per tile per day, after PGE12A has run for the tile. The operational scenario is 384 activations per day of each PGE, representing the processing of one tile per PGE.

4.13 Level 2G Reflectance/Fire (PGE13)

PGE13 is one of a series of land L2G processes dependent upon the completion of PGE12A, and is executed at GSFC.

Purpose

PGE13 produces the L2G surface reflectance (MOD092SR and MOD095SR) and fire (MOD14L2G) products.

Structure

PGE13 consists of the L2G surface reflectance (MOD_PR09G) and thermal anomalies (MOD_PR14G) processes. Figure C-13 shows the structure of PGE13.

Data Files

Process	Input	Output	Temporary
MOD_PR09G	MOD09, MODPT5M, MODPT25M	MOD092SR, MOD095SR	none
MOD_PR14G	MOD14, MODPT1KM	MOD14L2G	none

Activation Rules

PGE13 runs once per tile per day, after PGE12A has completed. The operational scenario is 338 activations per day representing the processing of one tile per PGE.

4.14 Level 2G Snow (PGE14)

PGE14 is the L2G snow cover process executed at GSFC.

Purpose

PGE14 produces the tiled snow cover product (MOD10L2G).

Structure

PGE14 consists of the tiled snow cover process (MOD_PR10G). Figure C-14 shows the structure of PGE14.

Data Files

Process	Input	Output	Temporary
MOD_PR10G	MOD10_L2, MODPT5M	MOD10L2G	none

Activation Rules

PGE14 runs once per land tile per day, after PGE12A has completed. The operational scenario is 338 activations per day representing the processing of one tile per PGE.

4.15 Level 2G Sea Ice (PGE15)

PGE15 is the L2G sea ice process executed at GSFC.

Purpose

PGE15 produces the tiled sea ice product (MOD29DG).

Structure

PGE15 consists of the tiled sea ice process (MOD_PR29G). Figure C-15 shows the structure of PGE15.

Data Files

Process	Input	Output	Temporary
MOD_PR29G	MOD29, MODPT5M	MOD29DG	none

Activation Rules

PGE15 runs once per land tile per day, after PGE12A has completed. The operational scenario is 130 activations per day representing the processing of one sea-ice tile per PGE.

4.16 Level 2 Land Surface Temperature (PGE16)

PGE16 is the L2 LST process executed at GSFC.

Purpose

PGE16 produces the tiled LST/emissivity products MOD11L2 and MOD11D3.

Structure

PGE16 consists of the tiled LST/emissivity process (MOD_PR11A). Figure C-16 shows the structure of PGE16.

Data Files

Process	Input	Output	Temporary
MOD_PR11A	MOD02, MOD03, MOD09, MOD35_L2, MOD10_L2, MOD07_L2, MOD11LUW, MOD11LCV	MOD11_L2, MOD11D3, MOD11D35	MOD11UPD

Activation Rules

PGE16 runs once per day. The primary inputs are MOD02, MOD03, MOD07_L2, MOD09, MOD35_L2, and MOD10_L2. The operational scenario is one activation per day representing the processing of up to 288 granules per PGE.

4.17 Level 3 Ocean Color (PGE17)

PGE17 is a L3 ocean process executed at GSFC.

Purpose

PGE17 produces the Ocean Color space-binned L3 products.

Structure

PGE17 performs the Ocean Color initial L3 binning. Figure C-17 shows the structure of PGE17.

Data Files

Process	Input	Output	Temporary
MOD_spbin	MODOCL2, MODOCL2A, MODOCL2B	MODOCB01 thru MODOCB36	none

Activation Rules

PGE17 runs once for each MODIS day-mode granule, after PGE9 has completed. PGE17 is activated 144 times per day, once for each day-mode granule.

4.18 Ocean Productivity (PGE18)

PGE18 is a weekly processing ocean PGE executed at GSFC.

Purpose

PGE18 produces the ocean productivity product (MOD27Y3).

Structure

PGE18 consists of the ocean productivity process (MOD_PR27_Y). Figure C-18 shows the structure of PGE18.

Data Files

Process	Input	Output	Temporary
MOD_PR27_Y	MODOCW26	MOD27Y3	none

Activation Rules

PGE18 runs after a weekly file is produced by PGE52. PGE18 is activated once per week.

4.19 Level 3 Sea Surface Temperature (PGE19)

PGE19 is a L3 ocean process executed at GSFC.

Purpose

PGE19 produces the sea surface temperature L3 space-binned product.

Structure

PGE19 consists of the sea surface temperature orbital night-mode processing (MOD_spbins). Figure C-19 shows the structure of PGE19.

Data Files

Process	Input	Output	Temporary
MOD_spbins	MOD28L2	MOD28BD1, MOD28BD2, MOD28BN1, MOD28BN2,	none

Activation Rules

PGE19 runs once per granule after PGE10 has completed. PGE19 is activated 288 times per day, once for each granule.

4.20 Level 3 Ocean Interim Daily (PGE20)

PGE20 consist of the L3 daily Ocean process executed at GSFC. This is the first in a series of Ocean time-binning PGEs. It is run separately for each Oceans parameter (color or SST).

Purpose

PGE20 produces Ocean interim daily products.

Structure

PGE20 performs the daily compositing of the Ocean color and SST data. Figure C-20 shows the structure of PGE20.

Data Files

Process	Input	Output	Temporary
MOD_mtbin	MODOCBnn ¹ or MOD28Bmm ¹	MODOCAnn ¹ or MOD28Amm ¹	none

¹ = nn can be 1 through 36; mm is one of D1, D2, N1, N2.

Activation Rules

PGE20 runs when a full day of PGE17 or PGE19 output has been produced. This PGE is activated 40 times per day, once for each MODIS Ocean parameter.

4.21 Level 3 Fire Daily (PGE21)

PGE21 is the first L3 Fire PGE, executed at the EROS Data Center (EDC).

Purpose

PGE21 produces the L3 Fire daily product.

Structure

PGE21 consists of the L3 Fire daily process (MOD_PR14A). Figure C-21 shows the structure of PGE21.

Data Files

Process	Input	Output	Temporary
MOD_PR14A	MOD14L2G, MODPT1KM	MOD14D3	none

Activation Rules

PGE21 runs after a full day's worth of PGE13 processing has been completed and transferred to EDC. This PGE is activated 338 times per day, once for each Land tile.

4.22 Level 3 Bi-directional Reflectance Distribution Function/Subsetting (PGE22)

PGE22 is the Bi-directional Reflectance Distribution Function (BRDF) process executed at EDC.

Purpose

PGE22 produces the BRDF subsetting (MOD43A3) and BRDF/albedo-texture (MOD43A4) products.

Structure

PGE22 consists of the BRDF subsetting process (MOD_PR43B1). Figure C-22 shows the structure of PGE22.

Data Files

Process	Input	Output	Temporary
MOD_PR43B1	MOD095SR, MOD092SR, MODPT5M, MODPT25M, MODPT1KM, MODGA	MOD43A3, MOD43A4	none

Activation Rules

PGE22 runs after a full day of MOD13 processing has completed and been transferred to EDC. The operational scenario is 338 activations per day, once for each land tile.

4.23 Level 3 Bi-directional Reflectance Distribution Function (PGE23)

PGE23 produces additional L3 BRDF products at EDC.

Purpose

PGE23 produces the BRDF/Albedo (MOD43A1) and BRDF adjusted nadir reflectance (MOD43A2) products.

Structure

PGE23 consists of the BRDF albedo process (MOD_PR43B2). Figure C-23 shows the structure of PGE23.

Data Files

Process	Input	Output	Temporary
MOD_PR43B2	MOD43A3, MOD43LUA, MOD43LUP, MOD43LUT	MOD43A1, MOD43A2	none

Activation Rules

PGE23 runs after 16 days of PGE22 processing has completed for a tile. The operational scenario is 338 activations every 16-days representing the processing of one land tile per run.

4.24 PGE24

PGE24 has been deleted from the V1 release.

4.25 Level 3 8-day Vegetation Indices (PGE25)

PGE25 is an 8-day vegetation indices process executed at EDC.

Purpose

PGE25 produces the 8-day gridded vegetation indices product.

Structure

PGE25 consists of the 8-day gridded vegetation indices process (MOD_PR13). Figure C-25 shows the structure of PGE25.

Data Files

Process	Input	Output	Temporary
MOD_PR13	MOD092SR, MOD095SR, MODPT25M, MODPT5M, MODGA	MOD13E3	none

Activation Rules

PGE25 runs after 8 days of PGE13 output has been transferred to EDC. The operational scenario is 338 activations per 8-days, representing the processing of one land-grid tile per run.

4.26 Level 3 8-day CMG Vegetation Indices (PGE26)

PGE26 is an 8-day CMG vegetation indices process executed at EDC.

Purpose

PGE26 produces the 8-day vegetation indices product.

Structure

PGE26 consists of the vegetation indices process (MOD_PR13C). Figure C-26 shows the structure of PGE26.

Data Files

Process	Input	Output	Temporary
MOD_PR13C	MOD13E3	MOD13EC	none

Activation Rules

PGE26 runs after 8 days of PGE25 processing has completed for all tiles for an 8-day period. The operational scenario is one activation every 8-days.

4.27 Level 3 16-day Vegetation Indices (PGE27)

PGE27 is the 16-day vegetation indices process executed at EDC.

Purpose

PGE27 produces the 16-day gridded vegetation indices product.

Structure

PGE27 consists of the 16-day gridded vegetation indices process (MOD_PR13A). Figure C-27 shows the structure of PGE27.

Data Files

Process	Input	Output	Temporary
MOD_PR13A	MOD092SR, MOD095SR, MODPT25M, MODPT5M, MODGA	MOD13S3	none

Activation Rules

PGE27 runs after 16 days of PGE13 output has been transferred to EDC. The operational scenario is 338 activations per 16 days representing the processing of one land-grid tile per run.

4.28 Level 3 Monthly Vegetation Indices (PGE28)

PGE28 is the monthly vegetation indices process executed at EDC.

Purpose

PGE28 produces the one-month gridded vegetation indices product.

Structure

PGE28 consists of the one-month gridded vegetation indices process (MOD_PR13B). Figure C-28 shows the structure of PGE28.

Data Files

Process	Input	Output	Temporary
MOD_PR13B	MOD092SR, MOD095SR, MODPT25M, MODPT5M, MODGA	MOD13M3	none

Activation Rules

PGE28 runs after 32 days of PGE13 output has been transferred to EDC. The operational scenario is 338 activations per 32 days representing the processing of one land-grid tile per run.

4.29 Level 3 Fire 8-day (PGE29)

PGE29 is the L3 8-day thermal anomalies PGE executed at EDC.

Purpose

PGE29 produces the 8-day composite thermal anomalies product (MOD14E3).

Structure

PGE29 consists of the composite thermal anomalies process (MOD_PR14A). Figure B-29 shows the structure of PGE29.

Data Files

Process	Input	Output	Temporary
MOD_PR14A	MOD14L2G, MODPT1KM	MOD14E3	none

Activation Rules

PGE29 runs after 8 days of day of PGE13 processing has completed and been transferred to EDC. The operational scenario is 338 activations every 8-days representing the processing of one land tile per run.

4.30 Level 3 Fire 16-Day (PGE30)

PGE30 is the L3 16-day thermal anomalies PGE executed at EDC.

Purpose

PGE30 produces the 16-day thermal anomalies product (MOD14S3).

Structure

PGE30 consists of the composite thermal anomalies process (MOD_PR14A). Figure C-30 shows the structure of PGE30.

Data Files

Process	Input	Output	Temporary
MOD_PR14A	MOD14L2G, MODPT1KM	MOD14S3	none

Activation Rules

PGE30 runs after PGE29. The operational scenario is 388 activations every 16 days representing the processing of one land tile per run.

4.31 PGE31

PGE31 has been deleted from the V1 release.

4.32 PGE32

PGE32 has been deleted from the V1 release.

4.33 Level 3/Level 4 Leaf Area Indices/Fraction Photosynthetically Active Radiation Daily (PGE33)

PGE33 consists of daily land processes executed at EDC.

Purpose

PGE33 produces the daily Leaf Area Indices (LAI) and Fraction Photosynthetically Active Radiation (FPAR) L3 and L4 products (MOD15D3 and MOD15D4).

Structure

PGE33 consists of the daily gridded LAI and FPAR processes (MOD_PR15A1 and MOD_PR15A2). Figure C-33 shows the structure of PGE33.

Data Files

Process	Input	Output	Temporary
MOD_PR15A1	MOD092SR, MOD095SR, MODPT25M, MODPT5M, MODGA	MOD15D3	none
MOD_PR15A2	MOD15D3, MOD15LUT	MOD15D4	none

Activation Rules

PGE33 runs after one days worth of PGE13 outputs are completed and transferred to EDC. The operational scenario is 338 activations per day.

4.34 Level 4 Leaf Area Indices/Fraction Photosynthetically Active Radiation 8-Day (PGE34)

PGE34 consists of the 8-day LAI/FPAR process executed at EDC.

Purpose

PGE34 produces the 8-day LAI and FPAR L4 product (MOD15E4).

Structure

PGE34 consists of the 8-day LAI and FPAR process (MOD_PR15). Figure C-34 shows the structure of PGE34.

Data Files

Process	Input	Output	Temporary
MOD_PR15	MOD15D4	MOD15E4	none

Activation Rules

PGE34 runs 8-days worth of PGE33 are completed. The operational scenario is 338 activations per 8-days, representing one run per land tile.

4.35 PGE35

PGE35 has been deleted from the V1 release.

4.36 Net Primary Production Ancillary (PGE36)

PGE36 consists of an ancillary data preprocessing process executed at EDC.

Purpose

PGE36 produces an ancillary interim product for Net Primary Production (NPP) processing (MOD17P).

Structure

PGE36 consists of the daily ancillary data preprocessing process (MOD_PR17P). Figure C-36 shows the structure of PGE36.

Data Files

Process	Input	Output	Temporary
MOD_PR17P	TBD	MOD17P	none

Activation Rules

PGE36 is schedule driven. It runs daily using ancillary input files for the day. The operational scenario is one activation per day.

4.37 Level 3 Net Primary Production Daily (PGE37)

PGE37 consists of the daily vegetation NPP process executed at EDC.

Purpose

PGE37 produces the daily vegetation NPP product (MOD17A1).

Structure

PGE37 consists of the daily vegetation NPP process (MOD_PR17). Figure C-37 shows the structure of PGE37.

Data Files

Process	Input	Output	Temporary
MOD_PR17	MOD15E4, MOD17P, MOD17LUT	MOD17D4, MOD17E4, MOD17Y4	none

Activation Rules

PGE37 runs after PGE34 and PGE36 processing has completed. The operational scenario is 338 activations per day, one run per land tile.

4.38 PGE38

PGE38 has been deleted from the V1 release.

4.39 PGE39

PGE39 has been deleted from the V1 release.

4.40 Level 3 Land Cover Monthly (PGE40)

PGE40 is the monthly land process executed at EDC.

Purpose

PGE40 produces the monthly gridded land cover database (MOD12_1M).

Structure

PGE40 consists of the monthly gridded land cover type process (MOD_PR12M). Figure C-40 shows the structure of PGE40.

Data Files

Process	Input	Output	Temporary
MOD_PR12M	MOD13M3, MOD33T3, MOD12_1M (previous), MOD43A1, MOD43A2, MOD43A4, MOD35ANC	MOD12_1M	none

Activation Rules

PGE40 runs after one month of PGE45, PGE28, and PGE23 output is produced at EDC. The operational scenario is 338 activations per month.

4.41 Level 3 Land Cover Quarterly (PGE41)

PGE41 is the quarterly gridded L3 land process executed at EDC.

Purpose

PGE41 produces the quarterly gridded land cover type product (MOD12Q).

Structure

PGE41 consists of the quarterly gridded land cover type process (MOD_PR12Q). Figure C-41 shows the structure of PGE41.

Data Files

Process	Input	Output	Temporary
MOD_PR12Q	MOD12_1M, MOD12LUT, MOD12Q3 (previous)	MOD12Q3	none

Activation Rules

PGE41 runs when three months of PGE40 products are produced at EDC. The operational scenario is 388 activations every three months.

4.42 PGE42

PGE42 has been deleted from the V1 release.

4.43 Level 3 Snow Daily (PGE43)

PGE43 is the daily snow cover L3 process. It is the first of several PGEs to be executed at NSIDC.

Purpose

PGE43 produces the gridded daily snow cover product (MOD10A1).

Structure

PGE43 consists of the gridded daily snow cover process (MOD_PR10A). Figure C-43 shows the structure of PGE43.

Data Files

Process	Input	Output	Temporary
MOD_PR10A	MOD10L2G, MODPT5M	MOD10A1	none

Activation Rules

PGE43 runs after a full day of PGE12A and PGE14 processing has completed and been transferred to NSIDC. The operational scenario is 338 activations per day representing the processing of one land tile per PGE.

4.44 Level 3 Sea Ice Daily (PGE44)

PGE44 is the day sea ice cover L3 process executed at NSIDC.

Purpose

PGE44 produces the gridded daily sea ice product (MOD29D3).

Structure

PGE44 consists of the gridded daily sea ice process (MOD_PR29A). Figure C-44 shows the structure of PGE44.

Data Files

Process	Input	Output	Temporary
MOD_PR29A	MOD29DG, MODPT5M	MOD29D3	none

Activation Rules

PGE44 runs after a full day of PGE12A and PGE15 processing has completed and been transferred to NSIDC. The operational scenario is 130 activations per day representing the processing of one sea-ice tile per PGE.

4.45 Level 3 Snow 10-day (PGE45)

PGE45 is the 10-day snow process executed at NSIDC.

Purpose

PGE45 produces the 10-day gridded snow cover product (MOD33T3).

Structure

PGE45 consists of the 10-day gridded snow cover process (MOD_PR33). Figure C-45 shows the structure of PGE45.

Data Files

Process	Input	Output	Temporary
MOD_PR33	MOD10A1	MOD33T3	none

Activation Rules

PGE45 runs when ten days worth of snow cover processing from PGE43 has completed. The operational scenario is 338 activations every ten days.

4.46 PGE46

PGE46 has been deleted from the V1 release.

4.47 Level 3 Sea Ice 10-day (PGE47)

PGE47 consists of the 10-day sea ice process executed at NSIDC.

Purpose

PGE47 produces the 10-day gridded sea-ice cover product (MOD42T3).

Structure

PGE47 consists of the 10-day gridded sea-ice cover process (MOD_PR42). Figure C-47 shows the structure of PGE47.

Data Files

Process	Input	Output	Temporary
MOD_PR42	MOD29D3	MOD42T3	none

Activation Rules

PGE47 runs after ten days of PGE44 has completed. The operational scenario is 130 activations every ten days.

4.48 PGE48

PGE48 has been deleted from the V1 release.

4.49 Level 3 Ocean Interim Weekly (PGE49)

PGE49 consists of Ocean interim weekly processing at GSFC.

Purpose

PGE49 produces Ocean interim weekly products.

Structure

PGE49 consists of the Ocean time binning processes (MOD_mtbin). Figure C-49 shows the structure of PGE49.

Data Files

Process	Input	Output	Temporary
MOD_mtbin	MODOCAnn ¹ OR MOD28Amm ¹	MODOCEnn ¹ OR MOD28mm ¹	none

¹ = nn can be 1 through 36; mm is one of D1, D2, N1, N2.

Activation Rules

PGE49 runs when 8-days of PGE20 processing has completed. The operations scenario is 40 activations every 8-days, once per oceans parameter.

4.50 Level 3 Ocean Interim 3 Week (PGE50)

PGE50 consists of Ocean interim 3 week processing at GSFC.

Purpose

PGE50 produces the Ocean interim 3 week products.

Structure

It consists of the Ocean Color interim 3 week process (MOD_mtbin). Figure C-50 shows the structure of PGE50.

Data Files

Process	Input	Output	Temporary
MOD_mtbin	MODOCEnn ¹ or MOD28Emm ¹	MODOCFnn ¹ or MOD28Fmm ¹	none

¹ = nn can be 1 through 36; mm is one of D1, D2, N1, N2.

Activation Rules

PGE50 runs every 8 days, using a sliding window of 24 days of PGE49 processing as input. The operations scenario is 40 activations every 8 days.

4.51 Level 3 Ocean 3 Week Reference (PGE51)

PGE51 consists of L3 Ocean 3 week reference processing at GSFC.

Purpose

PGE51 produces the Ocean reference products.

Structure

It consists of the Ocean Color 3 week reference process (MOD_mfill). Figure C-51 shows the structure of PGE51.

Data Files

Process	Input	Output	Temporary
MOD_mfill	MODOCFnn ¹ or MOD28Fmm ¹	MODOCRnn ¹ or MOD28Rmm ¹	none

¹ = nn can be 1 through 36; mm is one of D1, D2, N1, N2.

Activation Rules

PGE51 runs every 8 days following execution of PGE50. The operations scenario is 40 activations every 8 days.

4.52 PGE52

PGE52 has been deleted from the V1 release.

4.53 Level 3 Ocean Daily (PGE53)

PGE53 consists of the Ocean Daily processing at GSFC.

Purpose

PGE53 produces the Ocean Daily products.

Structure

PGE53 consists of the Ocean Daily processes (MOD_mcloud). Figure C-53 shows the structure of PGE53.

Data Files

Process	Input	Output	Temporary
MOD_mcloud	MODOCAnn ¹ OR MOD28Amm ¹ , MODOCRnn ¹ OR MOD28Rmm ¹ ,	MODOCDnn ¹ OR MOD28Dmm ¹	none

¹ = nn can be 1 through 36; mm is one of D1, D2, N1, N2.

Activation Rules

PGE51 runs after PGE51 processing has completed for the 24-day reference period. The operations scenario is 40 activations per day, once per oceans parameter.

4.54 Level 3 Ocean Weekly (PGE54)

PGE54 consists of the Ocean weekly processing at GSFC.

Purpose

PGE54 produces the Ocean weekly products.

Structure

PGE54 consists of the Ocean weekly processes (MOD_mtbin). Figure C-54 shows the structure of PGE54.

Data Files

Process	Input	Output	Temporary
MOD_mtbin	MODOCDnn ¹ OR MOD28Dmm ¹	MODOCWnn ¹ OR MODOCWmm ¹	none

¹ = nn can be 1 through 36; mm is one of D1, D2, N1, N2.

Activation Rules

PGE54 runs after 8-days of PGE53 processing has completed. The operations scenario is 40 activations every 8-days.

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5. SYSTEM PERFORMANCE

5.1 Performance Factors

Nominal performance can be evaluated based upon whether the planned product processing is being carried out on schedule and that all the required products are produced. Errors will be reported to the SMF log files and the system monitoring utilities should indicate that the PGE completed abnormally. Only under abnormal conditions should operator intervention be required. (Refer to Section 6, System Operation.)

5.2 Resource Utilization

The resource requirements for the MODIS processes are maintained in a separate Volumes and Loads database. This information shall be provided to ECS and the appropriate DAACs as part of the software deliveries.

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6. SYSTEM OPERATION

The MODIS SDP S/W runs in the DAACs under control of the SDPS, as discussed in Section 1. The activation rules for each PGE will be incorporated into Production Rules during SSI&T. In the V1 time frame (ECS Release A) the production rules are limited to defining input products by type and time range. This implies that some element of processing (e.g., Land L2G) will require manual intervention.

The PGE error reporting in the V1 SDP S/W is limited to success or failure. PGEs that return failure in the DAAC will require manual investigation by DAAC, ECS, and MODIS personnel.

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APPENDIX A: ACRONYMS AND ABBREVIATIONS

ATBD	Algorithm Theoretical Basis Document
BRDF	Bi-directional Reflectance Distribution Function
CMG	Climate Modeling Grid
CPU	Central Processing Unit
DAAC	Distributed Active Archive Center
DPS	Data Production Software
ECS	EOSDIS Core System
EDC	EROS Data Center
EGS	EOS Ground System
EOS	Earth Observing System
EOSDIS	Earth Observing System Data and Information System
ESDIS	Earth Science Data and Information System
ESDT	Earth Science Data Type
FOS	Flight Operations Segment
FPAR	Fraction Photosynthetically Active Radiation
GSC	General Sciences Corporation
GSFC	Goddard Space Flight Center
HDF	Hierarchical Data Format
I/O	Input/Output
ICD	Interface Control Document
IDL	Interactive Data Language
IFOV	Instantaneous Field-Of-View
IMSL	Information Management System Library
IT	Instrument Team
L1	Level 1
L1A	Level 1A
L1B	Level 1B
L2	Level 2
L2G	Level 2 Gridding
L3	Level 3
L4	Level 4
LAI	Leaf Area Indices
LST	Land Surface Temperature
LUT	Look-Up Table
MAST	MODIS Administrative Support Team
MCF	Metadata Configuration File

MCST	MODIS Characterization Support Team
MODIS	Moderate Resolution Imaging Spectroradiometer
NMC	National Meteorological Center
NPP	Net Primary Production
NSIDC	National Snow and Ice Data Center
PCF	Process Control File
PGE	Product Generation Executive
QA	Quality Assurance
SCF	Science Computing Facility
SDD	System Description Document
SDP	Science Data Production
SDP S/W	Science Data Production Software
SDPS	Science Data Processing Segment
SDPTK	Science Data Production Toolkit
SDST	Science Data Support Team
SGI	Silicon Graphics Inc.
SMF	Status Message Facility
SPSO	Science Processing Support Office
SSI&T	Science Software Integration and Test
SST	Sea Surface Temperature
SSTG	Science Software Transfer Group
STM	Science Team Member
TBD	To Be Determined
TLCF	Team Leader Computing Facility
URL	Universal Resource Locator
UTC	Unuversal Time Coordinated
V1	Version 1
V6	Version 6
WGS84	World Geodetic System 84
WWW	World Wide Web

APPENDIX B: REQUIREMENTS TRACEABILITY**Table B-1. Version 1 Requirements Traceability Matrix**

Req. #	Description	Traceability
Software Process Requirements		
3.1-1	A software process is defined as any element of executable software listed in Table 3-1.	1.3.3
3.1-2	The software processes listed in Table 3-1 are the complete set of processes that shall be incorporated in the V1 Release.	1.3.3
3.1-3	The output of the V1 software processes shall be consistent with the MODIS Data Product Catalog, which is available on-line at URL http://modarch.gsfc.nasa.gov/MODIS/DATAPROD/dataprodcatalog.html .	3
Science Data Processing Software Product Requirements		
4.1-1	A MODIS product shall be defined as any data file identified with a Product ID in Table 3-1.	1.3.3
4.1-2	The definition of the level of a given product shall adhere to Table 4-1, MODIS Data Level Definitions.	1.2
Operations Requirements		
5.1-2	The V1 Release shall integrate all software processes available to the SDST software integration team into a SDP S/W system that executes all processes in the MODIS TLMF, and executes the processes in the GSFC DAAC, EDC DAAC, and the National Snow and Ice Data Center (NSIDC) DAAC (if available in Release A) as specified in Table 3-1.	1.3, 4
5.2-1	A PGE shall execute MODIS software processes within the ECS environment.	1.3.1, 4

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APPENDIX C: PRODUCT GENERATION EXECUTIVE STRUCTURES

All figures in this section are cut and pasted from Cadre.